

## **Weed Control in Cole or Brassica Leafy Vegetables (Broc., Cabb., Caul., Collards, Mustard, Turnips, Kale) <sup>1</sup>**

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The Brassica leafy vegetables (cole crops) range from major crops such as cabbage to very minor ones including mustard and rape greens. Optimum production of these crops depends on successful control of weeds. Weeds reduce yields by direct competition for nutrients, water and light. Weed control is especially important early in the season when weed competition can substantially reduce vigor, uniformity and overall yield. In Florida, there are a large number of weeds that are also in the Cruciferae (mustard) family. These weeds in and around the field can breed and harbor insects and disease pathogens that can invade or spread to the crop soon after planting.

### **Management Practices**

Effective weed control should include a combination of management practices designed to suppress weeds during the entire year. Some of these practices are crop rotation, cover cropping, high planting density, mulching, cultivation, flooding, and herbicide use. The amount and timing of cultivation has been shown to be very important. Cultivating

more than one or two times early in the season was shown to reduce head quality and yield in cabbage.

The most effective weed management strategies must be made long before the crop is planted.

### **Planting Dates**

Planting dates can have an impact in a given region. Hard-to-control winter or summer annuals may be present in a field, dictating planting the crop when the specific weed or weeds are not growing. Cabbage is much more competitive against weeds when grown under optimal conditions. During the warmer part of the spring and fall seasons, wild radish will not reduce yields of cabbage up to 16 plants/meter of row. During the cooler part of the season, 1 wild radish plant will reduce yield significantly.

Perennial weeds such as nutsedge should be controlled during noncrop periods. Detailed weed maps made during several seasons will help in the decisions on when to plant and which herbicides are the most effective. These observations can influence subsequent herbicide and cultural control programs.

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For example, if one is growing cabbage from transplants and wishes to use either Dual or Goal for specific weed problems, the grower must plan on having at least 5 week old transplants in one inch cells. Use of younger transplants in smaller cells may result in phytotoxicity to the young plants.

## **Labels**

The labels for Dual on cabbage are third party registrations by TPR, Inc., Orlando. The label is issued by TPR, Inc. and is valid only when a grower indemnification agreement is signed.

The term "Brassica leafy vegetables" refers to a crop group set up by the EPA to allow tolerances to be established for the whole crop group. Bensulide (Prefar), DCPA (Dacthal), sethoxydim (Poast), clethodim (Select) and carfentrazone (Aim) are all labeled on the total Brassica leafy vegetable group. This includes the head and stem Brassica subgroup, including broccoli, Chinese broccoli, Brussel sprouts, cabbage, Chinese cabbage (napa), Chinese mustard cabbage, cauliflower, cavalo broccoli, and kohlrabi. It also includes the leafy Brassica greens subgroup, including broccoli raab, Chinese cabbage (bok choy and chilhilli), collards, kale, mizuna greens, mustard spinach, rape greens, and turnip greens. If the total crop group is not stated, then the product may only be used for those commodities listed on the label.

If a label states directions for cabbage, then it may only be used on cabbage; if it states cabbage and tight-headed Chinese cabbage, it may also be applied to the napa types of Chinese cabbage. The chilhilli types are classified as loose headed as is bok choy.

Listed in Table 1 are the herbicides that are suggested for use on the various crops in Florida. Before using a herbicide, read the label carefully and follow all directions and restrictions. To avoid confusion between formulations, suggested rates listed here are stated in pounds active ingredient per acre (lb. ai./acre).

**Table 1.** Chemical weed controls: broccoli, cabbage, cauliflower, collards, mustard, turnips and kale.

Herbicide	Labeled crops	Time of application to crop	Rate (lbs. AI/Acre)	
			Mineral	Muck
Bensulide (Prefar 4E)	Brassica (cole) leafy vegetables, cabbage, Chinese cabbage (Napa, bokchoy), broccoli, Chinese broccoli, Brussels sprouts, cauliflower, all Chinese Brassica crops collards, kale, kohlrabi, mezuna, mustard greens, rape greens	Preplant incorporate, Preemergence	5 - 6	----
<b>Remarks:</b> Preplant incorporate using power driven rotary cultivations or apply preemergence and incorporate with irrigation. Controls many grass weeds. Provides fair to good control of lambsquarter, purslane, and some amaranths. May be applied under polyethylene mulch.				
Carfentrazone (Aim)	Brassica leafy vegetables (all)	Preplant Directed-hooded Row-middles	0.031	0.031
<b>Remarks:</b> Aim may be applied as a post-directed hooded burn-down application to emerged broadleaf weeds in row middles. Aim is not labeled for grassy weeds. May be tank mixed with other herbicides registered for this treatment pattern. May be applied at 0.33 oz (0.008 lb ai) to 1 oz (0.025 lb ai). Use a quality spray adjuvant such as crop oil concentrate (coc) or non-ionic surfactant (nis) at recommended rates.				
Clethodim (Select) (Arrow)	Head and stem Brassicas Brassica leafy vegetables (See definition)	Postemergence	0.1 - 0.125	0.1-0.125
<b>Remarks:</b> Apply Select at 6-8 fl. oz. for the control of emerged annual and perennial grasses. Use a 1% v/v crop oil concentrate rate in the finished spray volume. Consult the label for rates on specific grass species. Do not apply more than 32 fl. oz. per acre per season. There is a 30 day PHI for the head and stem Brassicas and a 14 day PHI for the leafy Brassica greens.				
DCPA (Dacthal W-75) (Dacthal 6F)	Broccoli, Brussels sprouts, cabbage, cauliflower and all other Brassica (cole) leafy vegetables*	At seeding or transplanting	6 - 8	----
<b>Remarks:</b> Can be sprayed directly over transplants without injury. Application should be made prior to weed seed germination. If weeds have emerged, soil should be clean cultivated or weeded prior to application. Can be preplant incorporated. *Including: Chinese broccoli, broccoli raab (rapini), Chinese cabbage (bok choy, napa), Chinese mustard cabbage (gai choy), collards, kale, kohlrabi, mustard greens and rape greens.				
Glyphosate (Roundup, Durango, Touchdown, Glyphomax)	Brassica leafy vegetables	Chemical Fallow Preplant, pre emergence, Pre transplant	0.3 - 1.0	----
<b>Remarks:</b> Roundup, Glyphomax and Touchdown have several formulations. Check the label of each for specific labeling directions.				
S - Metolachlor (Dual Magnum)	Cabbage (tight-headed)	Posttransplant Transplanted	0.64	1.91

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Herbicide	Labeled crops	Time of application to crop	Rate (lbs. AI./Acre)	
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<p><b>Remarks:</b> Label is a third party registration by TPR, Inc. The label is issued by TPR and is valid only when a grower indemnification agreement is signed. Application should be made immediately after transplanting to plants that are at least 5 weeks old or grown in 1" diameter cells or larger. Use 0.64 lb ai (0.67 pints) on soils relatively course-textured or low in organic matter. Use higher rate (2 pints) on fine textured soils or high in organic matter. In order to protect ground water resources, do not apply more than 1.91 lb ai (2.0 pints) of Dual Magnum per crop on sandy soils or 3.81 lb ai (4.0 pints) of Dual Magnum per crop on organic soils. Chinese varieties are more sensitive to Dual Magnum injury. Use lower rates as determined for soil type.</p>				
Metolachlor (Dual Magnum)	Direct-seeded cabbage	Preemergence Postemergence (direct-seeded)	0.76 - 1.26	1.91 - 3.82
<p><b>Remarks:</b> Label is Third Party Registration by TPR Inc. May be applied preemergence or postemergence to direct seeded tight-headed cabbage. Preemergence applications should be made immediately after seeding at 0.8 to 1.33 pints/A on sandy soils or 2.0 to 4.0 pints on organic soils. Postemergence applications should be made at least 20 days after seeding. Apply only once per crop season. Chinese varieties are more sensitive to Dual Magnum injury. Use the lower rates. The use of Dual Magnum may result in leaf crumbling or cupping and twisting. Delayed maturity can be anticipated at higher rates. Climatic conditions during the growing season will affect efficacy and phytotoxicity. Postemergence application should be made at least 20 days after seeding. Apply once per crop season.</p>				
Napropamide (Devrinol 50DF)	Broccoli, cabbage, brussels sprouts, cauliflower	Posttransplant	2.0	----
<p><b>Remarks:</b> Apply to weed-free surface as a surface spray after transplanting. Sprinkler irrigate within 24 hours using sufficient water to wet the soil to a depth of 2 to 4 inches. Not labeled for direct-seeded in Florida and Georgia.</p>				
Oxyfluorfen Goaltender (Goal 2XL)	Broccoli, cabbage, cauliflower	Pretransplant	0.25 - 0.50	----
<p><b>Remarks:</b> Controls certain annual broadleaf weeds such as: carpetweed, redroot pigweed, common purslane and Pennsylvania smartweed. May provide suppression of galingosa, common lambsquarter and wild mustard. <b>Note:</b> Crop injury may result with the use of transplants less than 5 weeks old and grown in containers less than 1 inch square. Do not apply to fields that have had acetanilide (Dual, Lasso, Ramrod) application during the current growing season. Severe crop injury may occur.</p>				
Paraquat (Gramoxone Inteon)	Cabbage (including tight headed Chinese cabbage)	Postemergence Directed/shielded	0.312 - 0.47	0.312 - 0.47
<p><b>Remarks:</b> Apply as a postemergence directed spray/shielded to control emerged annual broadleaf weeds and grasses and for top kill and suppression of emerged perennial weeds after crop emergence or establishment. Apply as a dusted spray using 1 1/2 pts/acre in 40 to 70 gals. spray mix. Do not allow spray to contact cabbage plants as injury or excessive residue may result. Outer leaves should be stripped at time of harvest. Do not apply where Gramoxone Extra has been used as a pre-emergence spray. Add a nonionic surfactant or crop oil to spray volume.</p>				
Paraquat (Gramoxone Inteon) (Firestorm)	Broccoli, cabbage, Chinese cabbage, collards, turnip, cauliflower	Preplant, Preemergence	0.63 - 0.94 0.5 - 0.1	0.63 - 0.94 0.5 - 0.1
<p><b>Remarks:</b> Apply as a band treatment over the crop row or as a broadcast treatment before, during or after planting, but before the emergence of the crop. Weeds emerging after the application will not be controlled. Crop plants emerged at the time of application will be killed. Use a non-ionic surfactant in the spray mixture.</p>				
Pelargonic acid (Scythe)	Brassica crops (broccoli, cabbage, cauliflower, collards, kale, greens [mustard and turnip])	Preplant, Preemergence, Directed-Shielded	3 - 10% v/v	3 - 10% v/v

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Herbicide	Labeled crops	Time of application to crop	Rate (lbs. AI/Acre)	
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<p><b>Remarks:</b> Product is a contact, non-selective, foliar applied herbicide. There is no residual control. May be tank mixed with soil residual compounds. Consult label for rates and other information.</p>				
Sethoxydim (Poast)	Broccoli, cabbage, cauliflower, and all other Brassica (cole) leafy vegetables	Postemergence	0.188 - 0.28	0.188 - 0.28
<p><b>Remarks:</b> Controls actively growing grass weeds. A total of 3 pts. product per acre may be applied in one season. Do not apply within 30 days of harvest. Apply in 5 to 20 gallons of water adding 2 pts. of crop oil concentrate per acre. Unsatisfactory results may occur if applied to grasses under stress. Use 0.188 lb. ai. (1 pt.) on seedling grasses and up to 0.28 lb. ai. (1.5 pts.) on perennial grasses emerging from rhizomes, etc. Consult label for grass species and growth stage for best control.</p> <p>* Including: Chinese broccoli, Broccoli raab (rapini), Chinese cabbage (bok choy, napa), Chinese mustard cabbage (gai choy), collards, kale, kohirabi, mustard greens and rape greens.</p>				
Trifluralin (Treflan TR-10) (Treflan EC) (Treflan MTF) (Treflan 5)	Broccoli, cabbage, Brussels sprouts, cauliflower, turnip greens (for processing), collard, mustard, kale	Preplant incorporated (Direct-seeded and Transplanted) Preplant incorporated (Direct-seeded)	0.5 - 0.75 0.5 - 0.75	---- ----
<p><b>Remarks:</b> Controls germinating annuals, especially grasses. Incorporate 4 inches or less within 8 hours. Results in Florida are erratic on soils with low organic matter and clay contents. Note precautions of planting non-registered crops within 5 months.</p>				